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Application No. (if known): 10/018847 Attorney Docket No.: 05587-00324-US

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Appeal Brief (in triplicate)
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Application No.: 10/018847 Attorney Docket No.: 05587-00324-US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Frank Osan et al.

Application No.: 10/018847 Art Unit: 1711

Filed: December 18, 2001 Examiner: T. T. Tran

For: METHOD OF PRODUCING AMORPHOUS POLYOLEFINS WITH A WIDE MOLE WEIGHT DISTRIBUTION

Commissioner for Patents
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APPELLANTS' BRIEF

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TABLE OF CONTENTS

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APPEAL BRIEF

I. THE REAL PARTY OF INTEREST

Ticona GmbH is the real party of interest. The application was assigned and recorded on February 6, 2002, on Reel No. 012589 and Frame No. 0815.

II. RELATED APPEALS AND INTERFERENCES

The undersigned is not aware of any related appeals or interferences involving this application.

III. THE STATUS OF THE CLAIMS

Claims 1-10 have been cancelled. Claims 11-30 are pending. The subject of the appeal are claims 11-30 which are attached in Appendix I.

IV. STATUS OF AMENDMENTS AFTER FINAL

Applicants filed an Amendment After Final on May 14, 2004 and it was made of record pursuant to the Advisory Action mailed June 16, 2004.

V. SUMMARY OF THE INVENTION

The invention is drawn to a method of producing a bimodal or multimodal mixture of amorphous polyolefins of different mole weights (see page 1, lines 5-13 of the specification). According to the inventive method, at least one amorphous polyolefin of high molecular weight is contacted in a solution with at least one amorphous polyolefin of low molecular weight and is mixed and the solvent is removed.

An object of the applicants' invention was to provide an economical and environmentally friendly continuous process for producing a bimodal or multimodal mixture of one or more amorphous polyolefins (see page 3, lines 11-15 of the specification).

Applicants' invention pertains to a process for the preparation of a "bimodal" or multimodal amorphous polyolefin as a mix of two or more polymers having different molar masses. In such process, the polymers having different molar masses are prepared separately from each other, mixed in solution, homogenized in solution and subsequently the solvent is separated off.

VI. REFERENCE APPLIED AGAINST THE CLAIMS

Hatke et al. U.S. Patent No. 5,610,253 ("Hatke")

VII. THE REJECTIONS APPEALED FROM

1. Claims 11-28 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Hatke.

2. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatke as applied to claim 28 above.

VIII. THE ISSUES ON APPEAL

1. Whether claims 11-28 and 30 are rejectable under 35 U.S.C. 102(b) as being anticipated by Hatke?
2. Whether Hatke discloses or teaches the claimed feature of bimodal or multimodal?
3. Whether Hatke discloses or teaches the claimed process of a bimodal or multimodal amorphous polyolefin as a mixture of two or more polymers having different molar masses separately from each other?
4. Whether the Examiner has shown where Hatke teaches the features of the amorphous polyolefin having a high molar mass has a VN of > 80 ml/g and an M_w of > 90,000 g/mol when Hatke discloses a VN between 0.1 and 25 ml/g?
5. Whether claim 29 is rejectable under 35 U.S.C. 103(a) as being unpatentable over Hatke as applied to claim 28 above?

IX. GROUPING OF THE CLAIMS

Claims 11-28 and 30 have been grouped together by the Examiner. Claim 29 has been grouped separated by the Examiner. The applicants believe that these claims should not stand or fall together for the reasons discussed in the argument section.

Group I, hereinafter refers to claims 11, 16-28 and 30.

Group II hereinafter refers to claims 12-15.

Group III hereinafter refers to claims 29.

Again, these claims do not stand or fall together.

X. ARGUMENTS

A. Group I

Issue 1: Whether claims 11-28 and 30 are rejectable under 35 U.S.C. 102(b) as being anticipated by Hatke?

Issue 2: Whether Hatke discloses or teaches the claimed feature of bimodal or multimodal?

Claims 11-28 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Hatke.

Applicants' invention pertains to a process for the preparation of a "bimodal" or "multimodal" amorphous polyolefin as a mix of two or more polymers having different molar masses. In such process, the polymers having different molar masses are prepared separately from each other, mixed in solution, homogenized in solution and subsequently the solvent is separated off.

The terms multimodal, bimodal and monomodal are terms recognized by one of ordinary skill in the art. Performing a computer search in the U.S.P.T.O. web page reveals over 100 patents that contain these terms. For example, U.S. No. 5,527,867 at col. 1, lines 10-60 defines these terms as follows:

> **Polyolefins having a multimodal molecular weight distribution (MWD),** such as polyethylene, can be made into articles by a variety of methods, including, but not limited to, extrusion molding, thermoforming

> and rotational molding, and have advantages over typical polyolefins lacking a multimodal MWD. **Polyolefins having a multimodal MWD process more easily**, i.e., they can be processed at a faster throughput rate with lower energy requirements, and at the same time such polymers exhibit reduced melt flow perturbations and are preferred because of improved properties for applications such as blow molding and/or high strength films. Polymers having a multimodal MWD are generally characterized by having a broad MWD, or more that one MWD peak, as reflected by size exclusion chromatography (SEC) curves.
>
> There are several known methods of producing polyolefins having a multimodal MWD; however, each method has its own disadvantages. Polyolefins having a multimodal MWD can be made by employing two distinct and separate catalyst systems in the same reactor, each producing a polyolefin having a different MWD; however, catalyst feed rates are usually difficult to control and the catalysts can have a detrimental effect on each other. Polymer particles produced from a dual, or even multi-, catalyst system frequently are not uniform in size. Thus, segregation of the polymer during storage and transfer can produce non-homogeneous products.
>
> A polyolefin having a multimodal MWD can also be made by sequential polymerization in two or more separate reactors or blending polymers of different MWD during processing; however, both of these methods increase capital cost and problems discussed earlier regarding polymer segregation can occur.
>
> Multimodal MWD polyethylenes can also be obtained directly from a single reactor polymerization processing the presence of a catalyst system comprising two or more catalytic sites, such as, for example, metallocenes, wherein each site has different propagation and termination rate constants. At certain ratios, and in certain polymerization processes, even catalysts that have different catalytic sites can produce **a monomodal, or narrow, MWD polyolefin**. Unfortunately, even under ideal conditions, a dual site catalyst system can have decreased catalytic activity. While not wishing to be bound by theory, it is hypothesized that a metallocene can bind to, and therefor inhibit the reactivity of, some of the active chromium oxide catalytic sites. Unfortunately, there are limits to know methods of preparing these very desirable, multimodal, or broad, molecular weight distribution or multimodal molecular weight distribution polyolefins. (emphasis added)

Hatke describes the preparation of mono-modal polyolefines having the same chemical composition, however, a narrow molar mass distribution. The Examiner at page

3 of the Final Office Action referred to working examples 1 and 4 and comparative example 2. However, the applicants cannot find the disclosure of a polymer mix therefrom.

Working example 1 pertains to the preparation of a cycloolefin polymer in solution using 1-octene as a chain length limitator, wherein the produce is a polymer having a molar mass expressed as M_w of from 10,400 g/mol and a M_w/M_n ratio of 2.2 which is a narrow distribution. This is a

Working example 4 pertains again to the preparation of a cycloolefin polymer in solution using also 1-octene to limit the chain length, wherein the product is a polymer having a molar mass expressed as M_w of from 11,000 g/mol and a M_w/M_n ratio of 1.86 (see table 1 in column 9) which is a more narrow distribution.

Comparative example 2 pertains also to the preparation of a cycloolefin polymer in solution, wherein the 1-octene was omitted and the product was a polymer having a higher molar mass expressed as M_w of from 165,000 g/mol and a M_w/M_n ratio of 3.5 which is still a narrow distribution.

Hatke does not describe a mix as claimed by the instant application, but rather the preparation of different polymers separately. Thus, there is no suggestion for the person of ordinary skill in the art to mix up the polymer solutions and to approach a polymer comprising two molar mass polymer fractions and having a broad bimodal molar mass distribution or multimodal molar mass distribution which include at least one polyolefin which has a lower molar mass than said at least one polyolefin with said high molar mass.

Issue 3: Whether Hatke discloses or teaches the claimed process of a bimodal or multimodal amorphous polyolefin as a mixture of two or more polymers having different molar masses separately from each other?

The applicants previously argued in their first amendment that the claimed invention is a preparation of a bimodal or multimodal amorphous polyolefin as a mixture of two or more polymers having different molar masses separately from each other. The Examiner stated at page 5 of the Final Office Action, "however, this process is not included in the claim language. Neither the claim language includes the molar mass distribution of the polymers." The applicants believe that the claim language does include this feature (see claim 11 and previously presented independent claims 28 and 30). Claim 11 requires at least one polyolefin which has a lower molar mass than said at least one polyolefin with said high molar mass (see parts (a) and (b) of claim 11).

B. Group II

Issue 4: Whether the Examiner has shown where Hatke teaches the features of the amorphous polyolefin having a high molar mass has a VN of > 80 ml/g and an M_w of > 90,000 g/mol when Hatke discloses a VN between 0.1 and 25 ml/g?

In addition, to the arguments presented in Group I above Group II further requires the features of the amorphous polyolefin having a high molar mass has a VN of > 80 ml/g and an M_w of > 90,000 g/mol. Hatke discloses a VN between 0.1 and 25 ml/g (see col. 6, line 46). It is acknowledged that comparative examples all have VN's greater than 25 but these examples are monomodal and not bimodal or multimodal. These results (comparative examples) were considered inferior by Hatke.

The values comprised in claims 12 to 15 of applicants' invention are relevant only for the polymer fraction having the high molar mass. This polymer fraction, however, is

combined with another polymer fraction having a low molar mass. In the absence of any suggestion for the combination of the two polymers, the claimed mix is novel and is the result of an inventive step inasmuch as it was not obvious to the person of ordinary skill in the art whether a homogenous polymer will result having a high transparency (see table 1 on page 21 of the specification) and valuable mechanical and rheological properties as well (see page 14, lines 5-9).

C. **Group III**

Issue 5: Whether claim 29 is rejectable under 35 U.S.C. 103(a) as being unpatentable over Hatke as applied to claim 28 above?

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatke as applied to claim 28 above. In addition to the arguments presented in Group I, above, group III further requires said assembly is of two or more reactors connected in parallel.

Again, Hatke does not describe a mix as claimed by the instant application, but rather the preparation of different polymers separately. Thus, there is no suggestion for the person of ordinary skill in the art to mix up the polymer solutions and to approach a polymer comprising two molar mass polymer fractions and having a broad bimodal molar mass distribution or multimodal molar mass distribution which include at least one polyolefin which has a lower molar mass than said at least one polyolefin with said high molar mass.

XI. CONCLUSION

It is believed that the claims define an invention which is new, useful, and unobvious. For the above reasons, the applicants request passage to allowance. This brief is being submitted in triplicate. The PTO is authorized to charge Deposit Account No. 03-2775 the amount of $330.00. The Notice of Appeal was filed on June 28, 2004. It is believed that no extensions are required.

However, in the event that the undersigned is mistaken in his calculations, an appropriate extension of time to respond is respectfully petitioned for, and the Commissioner is hereby authorized to charge the account of the undersigned attorneys, Patent Office Deposit Account No. 03-2775, for any fees which may be due upon the filing of this paper.

Respectfully submitted,

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By _____

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APPENDIX I

1-10. (cancelled)

11. (previously presented) A process for the continuous preparation of a bimodal or multimodal mixture of two or more amorphous polyolefins having a different molar mass, wherein the viscosity ratio of at least two amorphous polyolefins having a different molar mass is less than 0.005 or greater than 4 which comprises

preparing the bimodal or multimoldal mixture by process a) or process b),

a) preparing the amorphous polyolefin having a high molar mass by solution polymerization in one reactor of an assembly of two or more reactors connected in parallel or in series and the other constituents of the mixture, which include at least one polyolefin which has a lower molar mass than said at least one polyolefin with said high molar mass, are produced in the other reactors after which the polyolefins are mixed in solution,

homogenizing the solution of polymer mixture obtained and separating off the solvent or

b) preparing the amorphous polyolefin having a high molar mass by solution polymerization in one reactor and the other constituents of the mixture, which include at least one polyolefin which has a lower molar mass than said at least one polyolefin with said high molar mass, are introduced in the form of a polymer solution into the solution flowing from the reactor,

and homogenizing the solution of polymer mixture obtained and separating off the solvent.

12. (previously presented) The process as claimed in claim 11, wherein the amorphous polyolefin having a high molar mass has a VN of > 80 ml/g and an M_w of > 90,000 g/mol.

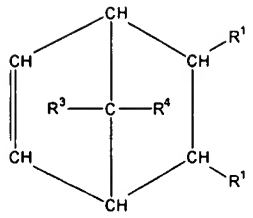
13. (previously presented) The process as claimed in claim 11, wherein the amorphous polyolefin having a high molar mass has a VN of > 100 ml/g and an M_w of > 100,000 g/mol.

14. (previously presented) The process as claimed in claim 11, wherein the amorphous polyolefin having a high molar mass has a VN of > 120 ml/g and an M_w of > 120,000 g/mol.

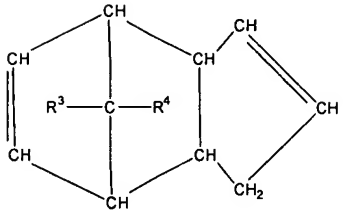
15. (previously presented) The process as claimed in claim 11, wherein the amorphous polyolefin having a high molar mass has a VN of >150 ml/g and an M_w of > 150,000 g/mol.

16. (previously presented) The process as claimed in claim 11, wherein the amorphous polyolefin is a cycloolefin copolymer.

17. (previously presented) The process as claimed in claim 11, wherein the bimodal or multimodal mixture comprises at least one cycloolefin copolymer comprising from 0.1 to 100% by weight, based on the total mass of the cycloolefin copolymer, of polymerized units derived from at least one polycyclic olefin of the formula I, II, II', III, IV, V or VI.



(I),



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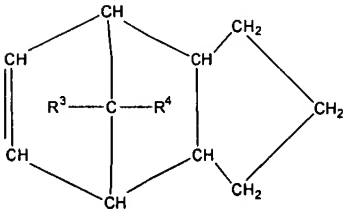

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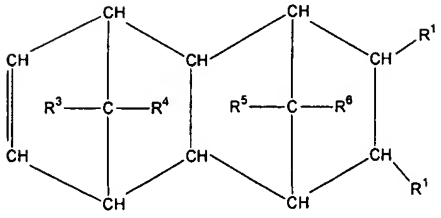

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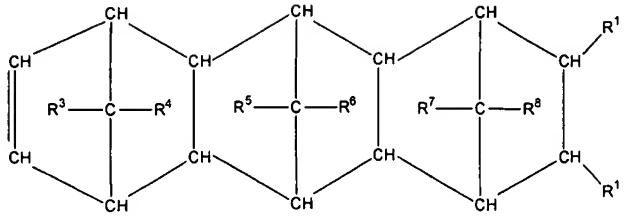

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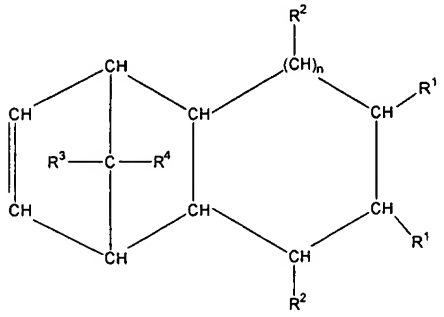

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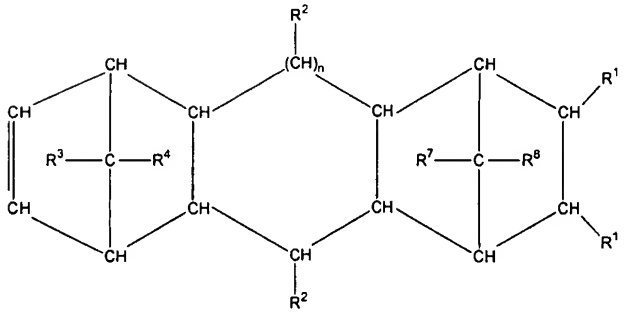
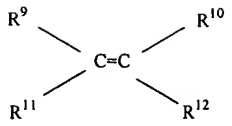


(VI),

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are identical or different and are each a hydrogen atom or a C_1-C_{20}-hydrocarbon radical, or form a saturated, unsaturated or aromatic ring,

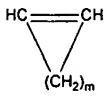
wherein identical radicals R^1 to R^8 in the various formulae 1 to VI can have different meanings, and n is from 0 to 5, and, optionally, up to 99.9% by weight, based on the total mass of the cycloolefin polymer, of polymerized units derived from one or more acyclic olefins of the formula VII



(VII),

wherein R^9, R^{10}, R^{11} and R^{12} are identical or different and are each a hydrogen atom, a linear, branched, saturated or unsaturated C_1-C_{20}-hydrocarbon radical.

18. (previously presented) The process as claimed in claim 17, wherein the cycloolefin copolymers further comprise up to 45% by weight, based on the total mass of the cycloolefin copolymer, or polymerized units derived from one or more monocyclic olefins of the formula VIII



(VIII)

wherein m is from 2 to 10.

19. (previously presented) The process as claimed in claim 18, wherein the cyclic and polycyclic olefins contain one or more substituents selected from the group consisting of halogen, hydroxyl, ester, alkoxy, carboxy, cyano, amido, imido and silyl.

20. (previously presented) The process as claimed in claim 18, wherein the cycloolefin copolymers comprise polymerized units derived from polycyclic olefins of the formula I or III and polymerized units derived from acyclic olefins of the formula VII.

21. (previously presented) The process as claimed in claim 18, wherein the cycloolefin copolymers comprises polymerized units derived from olefins having a norbornene skeleton.

22. (previously presented) The process as claimed in claim 18, wherein the cycloolefin copolymers comprise polymerized units derived from acyclic α-olefins having from 2 to 20 carbon atoms.

23. (previously presented) The process according to claim 18, wherein R^9, R^{10}, R^{11} and R^{12} are identical or different and are each a hydrogen atom, a C_1-C_8 alkyl radical or a C_6-C_{18} aryl radical.

24. (previously presented) The process as claimed in claim 21, wherein the cycloolefin copolymer comprise norbornene, tetracyclododecene, vinylnorbornene or norbornadiene.

25. (previously presented) The process as claimed in claim 22, wherein the α-olefin is ethylene.

26. (previously presented) The process according to claim 22, wherein the α-olefin is propylene.

27. (previously presented) The process according to claim 18, wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are identical or different and are each a hydrogen atom, a C_1-C_8 alkyl radical, C_6-C_{18} aryl radical, a C_7-C_{20} alkylenearyl radical, a cyclic or acyclic C_2-C_{20} alkenyl radical or form a saturated, unsaturated or aromatic ring.

28. (previously presented) A process for the continuous preparation of a bimodal or multimodal mixture of two or more amorphous polyolefins having a different molar mass wherein at least one polyolefin has a high molar mass and at least one polyolefin has a lower molar mass than said at least one polyolefin with said high molar mass which comprises solution polymerizing the amorphous polyolefin having a high molar mass in one reactor of an assembly of two or more reactors connected in parallel or in series and producing the amorphous polyolefin with the lower molecular mass in the other reactors mixing the amorphous polyolefin having a high molar mass with the amorphous polyolefin having a lower molar mass in solution,

homogenizing the solution of polymer mixture obtained and

separating off the solvent.

29. (previously presented) The process as claimed in claim 28, wherein said assembly is of two or more reactors connected in parallel.

30. (previously presented) A process for the continuous preparation of a bimodal or multimodal mixture of two or more amorphous polyolefins having a different molar mass wherein at least one polyolefin has a high molar mass and at least one polyolefin has a lower molar mass than said at least one polyolefin with said high molar mass, which comprises

solution polymerizing the amorphous polyolefin having a high molar mass in one reactor and introducing the amorphous polyolefin with the lower molecular mass in the form of a polymer solution into the solution flowing from the reactor,

homogenizing the solution of polymer mixture obtained and

separating off the solvent.